IOWA HIGHWAY RESEARCH BOARD (IHRB)

Minutes of September 27, 2013

Regular Board Members Present

A. Abu-Hawash
K. Jones
S. Okerlund
R. Knoche
D. Schnoebelen
W. Weiss
D. Miller
P. Assman
K. Mayberry
E. Steffensmeier
R. Fangmann

Alternate Board Members Present

D. Sprengeler for R. Younie
W. Klaiber for T. Wipf
P. Mouw

Members with No Representation

M. Kennerly
R. Kieffer

Secretary - M. Dunn

Visitors

Dave Claman	Iowa Department of Transportation
Mike Nop	Iowa Department of Transportation
Wayne Sunday	Iowa Department of Transportation
Dan Sprengeler	Iowa Department of Transportation
Leighton Christiansen	Iowa Department of Transportation
Linda Narigon	Iowa Department of Transportation
Kejin Wang	Iowa State University/In Trans
Jianguo Han	Iowa State University/In Trans
Chuck Jahren	Iowa State University/In Trans
Fangyu Guo	Iowa State University/In Trans
Chris Williams	Iowa State University/In Trans
Sunghwan Kim	Iowa State University/In Trans
Ashley Buss	Iowa State University/In Trans
Pavana Vennapusa	Iowa State University/In Trans
Rangan Gopalakrishnan	Iowa State University/In Trans
Lisa McDaniel	FHWA
Max Grogg	FHWA
Andy Wilson	FHWA
David Eash	USGS
Jon Nania	USGS
Gordon Smith	ICPA

The meeting was held at the Iowa Department of Transportation Ames Complex, Materials East/West Conference Room, on Friday, September 27, 2013. The meeting was called to order at 9:00 a.m. by Chairperson Ahmad Abu-Hawash with an initial number of 12 voting members/alternates at the table.

July Minutes
Motion to approve Minutes from the July 26, 2013 meeting

Motion to Approve by 1st E. Steffensmeier 2nd K. Mayberry
Motion carried with 12 Aye, 0 Nay, 0 Abstaining.

Review Proposals from 2013 First Round Solicitation:

RFP-IHRB-13-01 Iowa DOT Library Services, Collection, & Technology Assessment
Motion to approve by 1st W. Weiss, 2nd R. Knoche
Motion carried with 12 aye, 0 nay, 0 abstaining.

*****1 member joined the table. Total voting members 13**

RFP-IHRB-14-02 Validation of Gyratory Mix Design in Iowa
Motion to approve by 1st D. Miller, 2nd K. Jones
Motion carried with 13 aye, 0 nay, 0 abstaining.

RFP-IHRB-14-05 Impact of Curling and Warping on Concrete Pavement
Motion to approve by 1st R Fangmann, 2nd D. Schnoebelen
Motion carried with 13 aye, 0 nay, 0 abstaining.

FINAL REPORT, TR-638, *"Western Iowa Missouri River Flooding-Geo-Infrastructure Damage Assessment, Repair and Mitigation Strategies",* David White, ISU/InTrans, ($100,000)

BACKGROUND
The 2011 Missouri river flooding caused damage to many geo-infrastructure systems including levees, bridge abutments/foundations, paved and unpaved roadways, culverts, and embankment slopes in western Iowa. The total reported direct cost to repair flood-damaged transportation infrastructure on primary and secondary roadways in western Iowa was about $63.5 million. The extent of damage was in some cases directly observable, i.e., where segments of the roadway were washed away, but in many cases was undetermined, i.e., where the damage was below the pavement surface or around bridges.

OBJECTIVES
The proposed objectives of this research project are to:

A. Field Reconnaissance — Review the geotechnical problems and challenges in the affected counties and cities, and prioritize areas for detailed in-situ testing and evaluation.
B. In-Situ Testing and Evaluation — Conduct in-situ testing to conduct a geotechnical assessment of the flood affected areas. The in-situ testing will focus on:
    a. Evaluating roadway support capacities (both paved and unpaved roads)

b. Evaluating embankment conditions (slope failures)
c. Identifying settlement problems along roadway segments, and around bridge abutments and culverts.
d. Conducting a feasibility study for using 3D above water laser scanning coupled with 3D underwater sonar side scan technologies to evaluate the extent of erosion.
e. Evaluating conditions of drainage structures using a water proof pipe crawler camera.

C. Field Data Report, Repair and Mitigation Strategies, and Recommendations — Develop a field data report, provide repair and mitigation strategies depending on the assessment of the level and extent of the damage, and recommendations for geo-infrastructure monitoring.
D. Guide for Geo-Infrastructure Flood Damage Assessment and Repair Solutions — Develop the emergency response criteria and guidelines for evaluating geo-infrastructure and recommending repair solutions following a flood event.

DISCUSSION

Motion to Approve by 1st P. Assman, 2nd R. Knoche
Motion carried with 13 Aye, 0 Nay, 0 Abstaining.

FINAL REPORT, TR-635, *"Warm Mix Asphalt Phase II: Evaluation of WMA Quality Assurance Testing Protocols",* Chris Williams, ISU/InTrans, ($174,991)

BACKGROUND

The implementation of warm mix asphalt (WMA) is becoming more widespread with a growing number of contractors utilizing WMA technologies to take advantage of reduced mixing and compaction temperatures, reduced fuel consumption, and improved compactability. WMA technology has demonstrated beneficial economic value as well as environmental value in other parts of the US and Europe.

OBJECTIVES

The objective of Phase II of this study was to further evaluate the performance of plant-produced WMA mixtures. Phase II utilizes the information in Phase I to show a broader picture of how WMA additives impact the asphalt pavements.

More specifically, objectives were to detail curing behavior, quality assurance testing, and hybrid technologies, as follows:

• Compare the predicted and observed field performance of existing WMA trials produced in the previous Phase I study to that of HMA control sections to determine if Phase I conclusions are translating to the field

• Identify any curing effect (and timing of the effect) of WMA mixtures and binders in the field

• Determine how the field-compacted mixture properties and recovered binder properties of WMA compare to those of HMA over time for technologies common to Iowa

• Identify protocols for WMA sample preparation for volumetric and performance testing which best simulate field conditions

DISCUSSION

Q. When you spoke with your TAC about future performance evaluation did you talk about a mechanism for doing this?
A. We are pooling the projects we have had over the past few years into a field monitoring program. We are not seeing differences now but seeing some tendencies.

Q. Do you think the pavement management system would give you a detailed enough data?
A. No, I'm working on the basic parameters, but this will not give you the root cause for variations in performance.

Q. Would this study make us use more warm asphalt mixes?
A. Yes, it is encouraging. The conditioning for the lab testing was an important result and warm mix is not going away in near future so understanding it is essential.

Q. Have any of those changes been implemented for our standard testing as far as the conditioning?
A. Scott Schram is going to follow up this fall & winter with the Hamburg and the curing temperatures.

Motion to Approve by 1st K. Jones, 2nd P. R. Fangmann.
Motion carried with 13 Aye, 0 Nay, 0 Abstaining.

FINAL REPORT, TR-519, *"Implementing a StreamStats Web site for Iowa and developing flood-estimation equations for small and large drainage basins",* David Eash, U.S. Geological Survey, ($399,677)

BACKGROUND

Reliable estimates of annual exceedance-probability discharges (AEPDs) are essential for the economic planning and safe design of bridges, dams, levees, and other structures located along rivers and streams, and for the effective management of flood plains. Knowledge of AEPDs allows engineers and planners to standardize risk factors. For example, 1- and 0.2-percent AEPDs are used in the design for, and estimate of, scour at bridges (Arneson and others, 2012; Fischer, 1995) and to manage development on flood plains through the National Flood Insurance Program, administered by the Federal Emergency Management Agency (FEMA; Federal Emergency Management Agency, 2002). Methods that are as accurate as possible, yet easy to apply, are needed to estimate AEPDs at ungaged stream sites in Iowa because long-term annual peak-discharge data are available at few gaged sites.

Streamgages operated by the U.S. Geological Survey (USGS) are the primary source of long-term annual peak-discharge data in Iowa. Regression analyses performed on AEPDs computed from annual peak-discharge data collected at streamgages are used to develop equations to estimate AEPDs at ungaged sites. The equations are developed by statistically relating AEPDs to significant basin characteristics for selected streamgages. AEPDs computed for streamgages are statistics that can change as more annual peak-discharge data become

available. Statistics become more reliable as longer-term data are collected and used in the computations.

OBJECTIVES

Regression equations for estimating AEPDs were developed for use in Iowa and are described in this report. The regression equations relate AEPDs to physical and climatic characteristics of drainage basins. In addition, the regression equations developed from this study also will be included in the USGS StreamStats Web-based geographic information system (GIS) tool (*http://water.usgs.gov/osw/streamstats/index.html*). StreamStats allows users to obtain selected streamflow-statistic estimates, upstream drainage-basin characteristics, and other information for user-selected stream sites. Using a GIS-based interactive map of Iowa, the user can "point and click" on a stream site and StreamStats will delineate the basin boundary upstream from the selected site. The user also can "point and click" on USGS streamgages and receive selected streamflow statistics and other streamgage information.

DISCUSSION

Q. What is the DOT using that is the accepted methodology for determining run off and what should we be utilizing?
A. Once StreamStats is finalized Iowa DOT will have some guidance as to thresholds criteria which discharges should be estimated.

Q. At what point will StreamStats be implemented?
A. They are going to start working now we are estimating 2 to 3 months.

Q. Will StreamStats require any training?
A. It is fairly intuitive, but USGS and Iowa DOT are resources and can be contacted for questions. If training is needed later, we can work to get it done.

Q. Will this incorporate into the software that we currently use or do you take the data and manually input it.
A. We were originally going to make the update of the Culvert program and Bridge Backwater program go to this as a link, but we are finding that is not as easy as we thought. Now we are thinking about stripping the current methodology from those programs. You would enter in your peak discharges and get that from StreamStats or some other methodology.

Motion to Approve by 1st P. Assman, 2nd R. Knoche
Motion carried with 13 Aye, 0 Nay, 0 Abstaining.

PROPOSAL, *"Statistical Summary of Selected Iowa Streamflow Data",* David Eash, U.S. Geological Survey, ($55,750)

BACKGROUND

Sixteen years of streamflow data have been collected since the last streamflow statistics report was published for Iowa (Fischer and Eash, 1998). Major floods occurred in various parts of the State in 1998, 1999, 2000, 2002, 2004, 2008, 2010, 2011, and 2013. Extended periods of low flows occurred Statewide in the last half of 2011 and during all of 2012. New statistical summaries would provide managers and planners with more up-to-date long-term streamflow information. Because at least 10 years of streamflow record are required for computing

statistical summaries, 23 new streamgages that began operation between 1987 and 2003 that were not included in the last report, can now be included in an updated report.
Recent studies have found statistically significant trends in Iowa low-flow and flow-duration statistics (Eash and Barnes, 2012; Linhart and others, 2012,). Streamflow statistics computed for the last 30-year period of record (1984-2013), in addition to streamflow statistics computed for the entire period of record, would provide managers and planners with an alternative set of statistics that may be more relevant for some applications and that may provide valuable insight into current streamflow trends.

OBJECTIVES

The proposed project will compile two sets of statistics (1) long-term for the entire period of record and (2) recent-term for the 1984-2013 period of record. The recent-term statistics (second set) will only be computed for streamgages with streamflow records pre-dating the 1984 water year. The statistics will be computed for streamflow data collected at continuous-record streamgages in Iowa with at least 10 years of record. The statistics will be compiled on the daily mean and annual instantaneous peak values of streamflow data collected through water year 2013 (which ends September 30, 2013).

DISCUSSION

Motion to Approve by 1st E. Steffensmeier, 2nd D. Schnoebelen
Motion carried with 13 Aye, 0 Nay, 0 Abstaining.

PROPOSAL, HR-140, *"Collection & Analysis of Streamflow Data",* Jon Nania, U.S. Geological Survey, ($260,340)

BACKGROUND

Research project HR-140 was established July 1, 1968, by consolidating three separate research projects then under contract between the U.S Geological Survey (USGS) and the Iowa State Highway Commission. For the USGS, Iowa Water Science Center, HR-140 funds three separate programs: (1) continuous-record streamgages in Iowa, (2) partial-record crest-stage gages in Iowa, and (3) flood profiles of Iowa streams. The oldest of these three programs began operation in 1950; the other two began in 1957 and 1959.
The first research by the USGS for the Iowa State Highway Commission was a compilation and analysis of existing records of the flow of Iowa streams. This research produced Iowa Highway Research Bulletin I, *Iowa Floods--Magnitude and Frequency* (Schwob, 1953). Coincident with the preparation of this bulletin, the USGS established a number of streamgages on smaller streams in Iowa which generally drain areas of less than 100 square miles. Prior to this time, there existed only an extremely small amount of information on the magnitude of flow in these smaller streams. Currently, the streamflow gaging portion of project HR-140 fully or partially funds the operation and maintenance of approximately 109 streamgages on rivers and streams in Iowa. This network of stations includes fully funding 88 crest-stage-gages and partially funding 21 continuous-record streamgages. Site visits to each streamgage occurs on a six week interval for routine measurements of flow and gage inspection. During flood events, measurements of flow are made to better define the discharge rating curve. Publication of the most recent streamflow information was most recently published in *Water Resources Site Data Sheets for the United States, Water Year 2012*

OBJECTIVES

The objectives of this proposed research are to:

(1) Operate, maintain, and publish streamflow data for 21 continuous-record streamgages located throughout the State.

(2) Operate, maintain, and publish high-flow data for 80 partial-record (crest-stage) streamgages located throughout the State. Review and refine the existing crest-stage network to improve efficiency and reduce costs. Approximately eight non-real time crest-stage sites that are not producing beneficial peak-flow data to this study will be discontinued and those funds will be reprogramed to upgrade other sites to real-time.

(3) Collect and publish water-surface profiles, and storm and flood description information, for significant flood events of interest to the IDOT. Publish compilation report summarizing all flood-profile reports published by the USGS between 1963 and 2012.

DISCUSSION

Motion to Approve by 1st R. Knoche, 2nd R. Fangmann
Motion carried with 13 Aye, 0 Nay, 0 Abstaining.

FINAL REPORT, TR-634, *"Pilot Construction Project for Granular Shoulder Stabilization",* Charles Jahren, ISU/InTrans, ($85,920)

BACKGROUND

A shoulder edge-rut mitigation research project identified applications of acidulated soapstock, which is a soybean oil by-product, as a possible strategy to mitigate the development of edge ruts on roadways with granular shoulders (Jahren et al. 2011).

Evidence indicates that this strategy has the potential to reduce the number of required maintenance cycles on high-speed high-traffic roads (such as US Highway 20 near Jessup, Iowa with 9,000 vehicles per day/vpd annual average daily traffic/AADT and a speed limit of 65 mph) and last up to five years on moderate-speed medium-traffic roads (such as US 18 near Garner, Iowa with 6,000 AADT and a speed limit of 45 mph).

OBJECTIVES

The objective of the proposed research project was to assist the Iowa DOT in mitigating edge ruts on granular shoulders cost-effectively by pilot testing the use of soybean oil soapstock in a full-scale maintenance setting.

Pilot testing the material on roads with various AADT levels and shoulder conditions would provide an opportunity to better define situations where soybean oil soapstock and similar materials would be useful. The following questions would be answered:

- What level of AADT can the treatment tolerate?
- What amount of vehicle off-tracking can the treatment tolerate?
- How must the shoulder material be prepared prior to application given that developing a sufficiently solid surface for the base of the application was found to be a challenging task in areas that were rutted just prior to construction?
- Can the treatment be maintained to extend its life?

- How can the treatment be repaired efficiently when points of incipient failure develop?
- How can the Iowa Department of Transportation (DOT) purchase the material?
- What specifications are required so that the material be applied as part of a construction or maintenance contract?
- What other alternative strategies should be explored?

DISCUSSION

Q. Can you purchase soybean oil soapstock and is there information on how we would purchase it?
A. There is a draft specification in the report (Appendix B) for contract application of the material.

Q. Would the specification be a sole source type of specification?
A. I believe there are different distributers out there, but not from a practical point of view. At this time here would be one supplier to provide the material locally in Iowa. If the Iowa DOT was going to purchase this themselves, they would have to specify an acceptance test to demonstrate the product consistency was right so it would go through the distributer without complication.

Q. Is there documentation in the report that would support the purchasing?
A. There isn't anything specific but I would be happy to help figure out a distributer.

Q. Have you looked at the cost of the material application versus what it would be for normal maintenance?
A. It is $2,000.00 dollars a mile to spread soapstock per year. Cost effectiveness depends on how often you have to go out and maintain site. If you are going out every 2-3 weeks, it would be more cost effective than if you only are maintaining the site every few months or longer.

Motion to Approve by 1st W. Weiss, 2nd P. Assman
Motion carried with 13 Aye, 0 Nay, 0 Abstaining.

FINAL REPORT, TR-633, *"Investigation into Shrinkage of High Performance Concrete Used for Iowa Bridge Decks and Overlays",* Kejin Wang, ISU/InTrans, ($124,996)

BACKGROUND

High-performance concrete (HPC) is used increasingly in buildings and bridge structures due to its rapid strength development, superior workability, and excellent durability. However, with high cementitious material content, low water-to-cementitious material ratio, and various admixtures, HPC often possesses a high risk of shrinkage cracking.

OBJECTIVES

This research project was aimed at evaluating various shrinkage components (such as chemical, autogenous, and drying shrinkage) in the HPC mixes used for bridge decks and overlays in Iowa, assessing the cracking potential of the HPC mixes, and providing recommendations for reducing the concrete shrinkage cracking potential.

DISCUSSION

Q. Would we have enough information about some of our mixes that we have tried and could identify them on just the mix design as having higher or lower cracking potential that we could do a field evaluation on how they actually performed versus what you would have expected from the mix design?
A. There are a lot of factors that lead to a cracking problem, not the least of which is the construction. I don't think you could eliminate some of those variables as possible contributing factors for cracking by simply looking at the mix designs.

Motion to Approve by 1st K. Jones, 2nd W. Weiss
Motion carried with 13 Aye, 0 Nay, 0 Abstaining.

NEW BUSINESS
None

ADJOURN

The next meeting of the Iowa Highway Research Board will be held Friday, October 25, 2013, in the East/West Materials Conference Room at the Iowa DOT. The meeting will begin promptly at 9 a.m.

Mark J. Dunn

Mark J. Dunn, IHRB Secretary